

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicants:	Aditya Mohan et al.	§	Art Unit:	2445
		§		
Serial No.:	10/699,359	§	Conf. No.:	2528
		§		
Filed:	October 30, 2003	§	Examiner:	Tanim M. Hossain
		§		
Title:	Method And Apparatus	§	Docket No.	200208216-1
	For Representing Data	§		(HPC.0816US)
	Available In A Peer-To-	§		
	Peer Network Using	§		
	Bloom Filters	§		

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**APPEAL BRIEF**

## TABLE OF CONTENTS

REAL PARTY IN INTEREST .....	3
RELATED APPEALS AND INTERFERENCES.....	4
STATUS OF CLAIMS .....	5
STATUS OF AMENDMENTS .....	6
SUMMARY OF CLAIMED SUBJECT MATTER .....	7
GROUND OF REJECTION TO BE REVIEWED ON APPEAL .....	10
ARGUMENT .....	11
CLAIMS APPENDIX.....	17
EVIDENCE APPENDIX.....	21
RELATED PROCEEDINGS APPENDIX .....	22

### **REAL PARTY IN INTEREST**

The Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

### **RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

### **STATUS OF CLAIMS**

The application was originally filed with claims 1-25. During prosecution of the application, claims 21-23 were cancelled. The final rejections of claims 1, 4, 5, 8, 12, 14, 16, 19 and 24 are the subject of this appeal. The final rejections of claims 2, 3, 6, 7, 9-11, 13, 15, 17, 18, 20 and 25 are not the subject of this appeal.

### **STATUS OF AMENDMENTS**

An amendment is being submitted concurrently herewith to correct a clerical error in claim 8 and change the language "the search expression" to "a search expression." It is assumed for purposes of this Appeal Brief that this amendment has been entered.

## **SUMMARY OF CLAIMED SUBJECT MATTER**

At this point, no issue has been raised that would suggest that the words in the claims have any meaning other than their ordinary meanings. Nothing in this section should be taken as an indication that any claim term has a meaning other than its ordinary meaning.

Claim 1 recites a processor-implemented method for searching for a data object in a plurality of nodes that form a peer-to-peer network. The method includes forming Bloom-Filters at the nodes as a function of data available via the nodes (Specification, para. no. [0036], ll. 21-25, p. 10 through ll. 1-2, p. 11); communicating the Bloom-filters between peer-to-peer coupled nodes of the peer-to-peer network that have formed connections using incentive-based criteria to control whether one node connects to another node (Specification, para. no. [0031], ll. 8-18, p. 9); forming a search expression for locating the data object (Specification, para. nos. [0032] ll. 19-24, p. 9 and [0035], ll. 12-20, p. 10); for a given node of the plurality of nodes, evaluating other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression (Specification, para. no. [0035], ll. 12-20, p. 10); propagating the search expression to the selected nodes (Specification, para. no. [0035], ll. 12-20, p. 10); and outputting a result of the search expression from nodes that satisfy the search expression (Specification, para. no. [0023], ll. 1-11, p. 7).

The system of independent claim 8 recites a plurality of data processors that are coupled via a peer-to-peer network arrangement. Each data processor includes the following: a network interface arranged to provide one or more respective connections with one or more associated data processor of the peer-to-peer network arrangement, where the connections formed using an incentive-based criteria (Specification, para. no. [0026], ll. 2-5, p. 8); a memory for storing one or more respective remote Bloom filters representing data accessible via the associated connections (Specification, para. no. [0026], ll. 2-5, p. 8 and para. no. [0036], ll. 21-25, p. 10 through ll. 1-2, p. 11); and a processing unit. The processing unit is arranged to form a query Bloom-filter based on a data query (Specification, para. nos. [0032], ll. 19-24, p. 9 and [0035], ll. 12-20, p. 10); for a given node of the plurality of nodes, evaluate other nodes of the plurality of

nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression (Specification, para. no. [0035], ll. 12-20, p. 10); select a subset of the connections as a function of the query Bloom-filter and the respective remote Bloom-filters associated with the connections (Specification, para. no. [0035], ll. 12-20, p. 10); and send the data query to the subset of the connections (Specification, para. no. [0035], ll. 12-20, p. 10).

The computer-readable storage medium of claim 16 has instructions stored thereon, which are executable on a processor for performing the following steps. The steps include forming one or more respective peer-to-peer connections with one or more network peers of the processor using an incentive-based criteria (Specification, para. no. [0036], ll. 21-25, p. 10 through ll. 1-2, p. 11); receiving respective remote Bloom-filters representing data accessible via associated peer-to-peer connections; forming a query Bloom-filter based on a data query (Specification, para. nos. [0031], [0032] and [0035], ll. 12-20, p. 10); for a given node, evaluating other nodes connected to the given node to select nodes to propagate a search expression associated with the query based on incentive-based criteria and the one or more respective remote Bloom filters (Specification, para. no. [0035], ll. 12-20, p. 10); selecting a subset of the peer-to-peer connections as a function of the query Bloom-filter and the respective remote Bloom filters associated with the peer-to-peer connections (Specification, para. no. [0035], ll. 12-20, p. 10); and sending the data query to the subset of the connections (Specification, para. no. [0035], ll. 12-20, p. 10).

The data processing arrangement of claim 24 includes means comprising a processor to store data objects (Specification, para. no. [0026], ll. 2-5, p. 8); means including a processor to form respective peer-to-peer data connections with one or more network peers using an incentive-based criteria (Specification, para. no. [0026], ll. 2-5, p. 8); means including a processor to store remote Bloom-filters associated with respective peer-to-peer data connections, the Bloom-filters indicating data accessible via the respective peer-to-peer data connections (Specification, para. no. [0035], ll. 12-20, p. 10); means including a processor to form a query for locating one or more data objects of the network peers (Specification, para. no. [0031], ll. 8-18, p. 9, [0032], ll. 19-24, p. 9 and [0035], ll. 12-20, p. 10); means including a processor to, for a



given node of the plurality of nodes, evaluate other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression (Specification, para. no. [0023], ll. 1-11, p. 7); and means including a processor to send the query to a subset of the peer-to-peer data connections as a function of the query and the Bloom filters associated with the respective peer-to-peer data connections (Specification, para. no. [0035], ll. 12-20, p. 10).

**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

- A. Whether Claims 1, 4, 5, 8, 12, 14, 16, 19 and 24 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**
- 1. Whether Claims 1, 8, 16 and 24 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**
  - 2. Whether Claim 4 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**
  - 3. Whether Claim 5 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**
  - 4. Whether Claims 12 and 19 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**
  - 5. Whether Claim 14 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

## ARGUMENT

### **A. Whether Claims 1, 4, 5, 8, 12, 14, 16, 19 and 24 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

#### **1. Whether Claims 1, 8, 16 and 24 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

Claim 1 recites a processor-implemented method for searching for a data object in a plurality of nodes that form a peer-to-peer network. The method includes forming Bloom-Filters at the nodes as a function of data available via the nodes; communicating the Bloom-filters between peer-to-peer coupled nodes of the peer-to-peer network that have formed connections using incentive-based criteria to control whether one node connects to another node; forming a search expression for locating the data object; for a given node of the plurality of nodes; evaluating other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression; propagating the search expression to the selected nodes; and outputting a result of the search expression from nodes that satisfy the search expression.

Claim 1 stands rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. US 2003/0126122 (hereinafter called "Bosley"). Bosley generally discloses embedding a distributed index in a routing layer to purportedly enable a fast search on inquiries.

Independent claim 1 recites, for a given node of the plurality of nodes that are connected together, evaluating other nodes of the plurality of nodes to select one or more of the other nodes to propagate a search expression as a function of Bloom-filters and incentive-based criteria.

In order to anticipate a claim under 35 U.S.C. § 102, a single reference must teach each and every element of the claim. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). In fact, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). Furthermore, in order for a reference to be anticipatory, "[its] elements must be arranged as required by the claim." *In re Bond*, 910 F.2d 831 (Fed. Cir. 1990), *cited in* M.P.E.P. § 2131.

In the § 102 rejection of claim 1, the Examiner apparently relies on paragraph nos. [0103] and [0141] for the purported disclosure of forming contacts by incentive-based criteria. Final

Office Action, p. 8. Moreover, the Final Office Action states that paragraph nos. [0090] and [0114] of Bosley purportedly teach the propagation of Bloom-filters to nodes in the contact list, and the Final Office Action states that claim 1 of Bosley teaches the selection of nodes to propagate a search expression. Final Office Action, p. 8.

Applicant respectfully submits, however, that the Examiner fails to establish a *prima facie* case of anticipation of claim 1 by Bosley for at least the reason that Bosley fails to disclose evaluating connected nodes to a given node based on Bloom-filters and incentive-based criteria to select one of the connected nodes to propagate a search expression (emphasis added). In this manner, instead of examining the expressly-worded limitations, the Examiner merely refers to Bosley's discussion in paragraph no. [0141] directed to deriving a direct contact list. This direct contact list, however, does not disclose evaluating connected nodes for purposes of propagating a search expression. Moreover, as explained in paragraph no. [0151] of Bosley, this contact list is used for purposes of establishing node connections, not for purposes of selecting or evaluating connected nodes for the propagation of search expression. Claim 1 of Bosley, which the Examiner also appears to rely on for these limitations also fails to recite evaluating connected nodes based on Bloom-filters and incentive-based criteria to select one of the nodes to propagate a search expression.

Thus, for at least the foregoing reasons, Bosley fails to anticipate independent claim 1.

Independent claim 8 also stands rejected under 35 U.S.C. § 102(e) as being anticipated by Bosley. However, the system of claim 8 recites a processing unit that is arranged to, for a given node of a plurality of nodes, evaluate other nodes of the plurality of nodes that are connected to the given node based on Bloom-filters and incentive-based criteria to select one of these nodes to propagate a search expression. For at least the same reasons that are set forth above for claim 1, Bosley fails to disclose a processing unit that is arranged to perform this recited function. In this regard, even assuming, *arguendo*, that Bosley discloses evaluating nodes for connections based on incentive-based criteria, the Final Office Action still fails to cite any language of Bosley to support the contention that the skilled artisan would have gleaned the expressly-worded limitations relating to evaluating connecting nodes for propagating a search expression as set forth in claim 8. Thus, for at least any of these reasons, the § 102(e) rejection of independent claim 8 is in error.

Independent claims 16 and 24 also stand rejected under 35 U.S.C. § 102(e) in view of Bosley and overcome these rejections for similar reasons. In this regard, the computer readable storage medium of claim 16 has instructions stored thereon, which are executable on a processor for performing steps that include, for a given node, evaluating other nodes connected to the given node to select nodes to propagate a search expression associated with a query based on incentive-based criteria and one or more respective remote Bloom filters; and the data processing arrangement of independent claim 24 recites means including a processor to, for a given node of a plurality of nodes, evaluate other nodes of the plurality of nodes that connected to the given node based on Bloom-filters and incentive-based criteria to select one or more of the other nodes to propagate a search expression.

Thus, the § 102 rejections of claims 1, 8, 16 and 24 are in error and should be reversed.

**2. Whether Claim 4 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

Claim 4 depends from claim 3 and recites that comparing a query Bloom-filter to respective Bloom-filters includes forming a ranking associated with respective Bloom-filters as a sum of bits of the query Bloom-filter that match the bits of the respective Bloom-filter.

Claim 4 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Bosley. Claim 4 overcomes the § 102 rejection for at least the same reasons as claim 1. Claim 4 overcomes the § 102 rejection for at least the additional, independent reasons that are set forth below.

In the § 102 rejection of claim 4, the Examiner relies on paragraph nos. [0090], [0105], [0112], [0113] and [0114] of Bosley. Final Office Action, p. 3. However, none of these paragraphs disclose forming a ranking associated with respective Bloom-filters. Moreover, as the recited language fails to disclose forming a ranking, none of the cited paragraphs disclose forming a ranking as a sum of bits of a query Bloom-filter that match bits of a respective Bloom-filter.

Thus, for at least any of the foregoing reasons, the § 102 rejection of claim 4 is in error and should be reversed.

**3. Whether Claim 5 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

Claim 5 depends from claim 3 and recites that comparing a query Bloom-filter to Bloom-filters includes forming a ranking associated with respective Bloom-filters as a count of bits of the query Bloom-filter that match the bits of a respective Bloom-filter.

Claim 5 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Bosley. Claim 5 overcomes the § 102 rejection for at least the same reasons as claim 1, as discussed above. Claim 5 overcomes the § 102 rejection for at least the additional, independent reasons that are set forth below.

In the § 102 rejection of claim 5, the Examiner relies on paragraph nos. [0112], [0113], [0114], [0168], [0169], [0170] and [0173] of Bosley. Final Office Action, p. 3. However, none of these paragraphs disclose forming a ranking associated with respective Bloom-filters. Moreover, as none of these paragraphs disclose forming the ranking, none of the cited paragraphs disclose forming a ranking as a count on bits of a query Bloom-filter that match bits of a respective Bloom-filter.

Thus, for at least any of the foregoing reasons, the § 102 rejection of claim 5 is in error and should be reversed.

**4. Whether Claims 12 and 19 Are Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

Claim 12 depends from claim 11 and recites that the Bloom filter is formed as a logical OR of remote Bloom filters of respective data processors except for a remote Bloom filter that is associated with a selected connection.

Claim 19 depends from claim 18 and recites that the Bloom filter is formed as a logical OR of the remote Bloom filters of a processor except for a remote Bloom filter that is associated with a selected peer-to-peer connection.

Claims 12 and 19 each stand rejected under 35 U.S.C. § 102(e) as being anticipated by Bosley. Claims 12 and 19 overcome the § 102 rejections for at least the same reasons as claims 11 and 16, respectively, from which they depend. Claims 12 and 19 overcome the § 102 rejections for at least the additional, independent reasons that are set forth below.

In the § 102 rejections of claims 12 and 19, the Examiner relies on paragraph nos. [0112], [0113], [0168], [0169], [0170] and [0173] of Bosley. Final Office Action, pp. 5 and 6. However, none of these paragraphs disclose forming a Bloom filters as a logical OR of remote Bloom filters except for a remote Bloom filter associated with a selected peer-to-peer connection. Moreover, although Bosley generally discloses that Bloom filters are used to merge indices (*see, for example*, Bosley, para. no. [0105]), the skilled artisan would not glean from Bosley's disclosure the specific way in which claims 12 and 19 recite that the Bloom filter is formed, i.e., as a logical OR with a specifically-defined excluded Bloom filter.

Thus, for at least any of the foregoing reasons, the § 102 rejections of claims 12 and 19 are in error and should be reversed.

**5. Whether Claim 14 Is Anticipated by U.S. Patent Application Publication No. US 2003/0126122 (Bosley)?**

Claim 14 depends from claim 13 and recites that a Bloom filter is formed as a logical OR of: a local Bloom-filter and the remote Bloom filters of a respective data processor except for a remote Bloom filter associated with a selected connection.

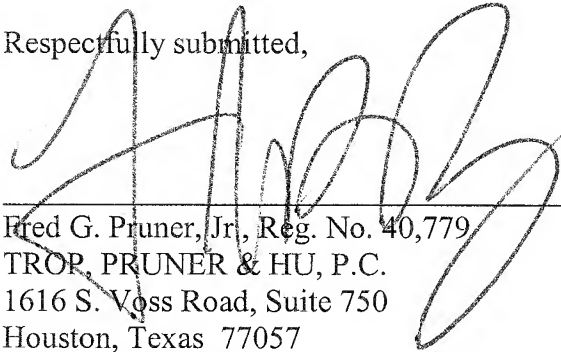
Claim 14 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Bosley. Claim 14 overcomes the § 102 rejection for at least the same reasons as claim 11, as discussed above. Claim 14 overcomes the § 102 rejection for at least the additional, independent reasons that are set forth below.

In the § 102 rejection of claim 14, the Examiner relies on paragraph nos. [0112], [0113], [0114], [0168], [0169], [0170] and [0173] of Bosley. However, the cited language fails to disclose the specific way that claim 14 recites for forming a Bloom filter. In this manner, claim 14 recites that the Bloom filter is formed as a logical OR of a local Bloom filter and remote Bloom filters except for a remote Bloom filter associated with a selected connection. Bosley fails to disclose a Bloom filter, as defined in claim 14. Therefore, for at least this additional, independent reason, the § 102 rejection of claim 14 is deficient.

Thus, for at least any of the foregoing reasons, the § 102 rejection of claim 14 is in error and should be reversed.

Applicant respectfully requests that each of the final rejections be reversed and that the claims subject to this Appeal be allowed to issue.

Respectfully submitted,



Date: November 15, 2010

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## CLAIMS APPENDIX

The claims on appeal are:

1. A processor-implemented method for searching for a data object in a plurality of nodes forming a peer-to-peer network, the method comprising:
  - forming Bloom-Filters at the nodes as a function of data available via the nodes;
  - communicating the Bloom-filters between peer-to-peer coupled nodes of the peer-to-peer network that have formed connections using incentive-based criteria to control whether one node connects to another node;
  - forming a search expression for locating the data object;
  - for a given node of the plurality of nodes, evaluating other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression;
  - propagating the search expression to the selected nodes; and
  - outputting a result of the search expression from nodes that satisfy the search expression.
4. The method of claim 3, wherein comparing the query Bloom-filter to the respective Bloom-filters includes forming a ranking associated with respective Bloom-filters as a sum of bits of the query Bloom-filter that match the bits of the respective Bloom-filter.
5. The method of claim 3, wherein comparing the query Bloom-filter to the Bloom-filters includes forming a ranking associated with respective Bloom-filters as a count of bits of the query Bloom-filter that match the bits of the respective Bloom-filter.

8. A system comprising:

- a plurality of data processors coupled via a peer-to-peer network arrangement, each data processor including:
  - a network interface arranged to provide one or more respective connections with one or more associated data processor of the peer-to-peer network arrangement, the connections formed using an incentive-based criteria;
  - a memory for storing one or more respective remote Bloom filters representing data accessible via the associated connections; and
  - a processing unit arranged to:
    - form a query Bloom-filter based on a data query;
    - for a given node of the plurality of nodes, evaluate other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate a search expression;
    - select a subset of the connections as a function of the query Bloom-filter and the respective remote Bloom-filters associated with the connections; and
    - send the data query to the subset of the connections.

12. The system of claim 11, wherein the Bloom filter is formed as a logical OR of the remote Bloom filters of the respective data processors except for the remote Bloom filter associated with the selected connection.

14. (Original) The system of claim 13, wherein the Bloom filter is formed as a logical OR of: the local Bloom-filter; and  
the remote Bloom filters of the respective data processor except for the remote Bloom filter associated with the selected connection.

16. A computer-readable storage medium having instructions stored thereon which are executable on a processor for performing steps comprising:

forming one or more respective peer-to-peer connections with one or more network peers of the processor using an incentive-based criteria;

receiving respective remote Bloom-filters representing data accessible via associated peer-to-peer connections; forming a query Bloom-filter based on a data query;

for a given node, evaluate other nodes connected to the given node to select nodes to propagate a search expression associated with the query based on incentive-based criteria and the one or more respective remote Bloom filters;

selecting a subset of the peer-to-peer connections as a function of the query Bloom-filter and the respective remote Bloom filters associated with the peer-to-peer connections; and

sending the data query to the subset of the connections.

19. The computer-readable storage medium of claim 18, wherein the Bloom filter is formed as a logical OR of the remote Bloom filters of the processor except for the remote Bloom filter associated with the selected peer-to-peer connection.

24. A data processing arrangement, comprising

means comprising a processor to store data objects;

means comprising a processor to form respective peer-to-peer data connections with one or more network peers using an incentive-based criteria;

means comprising a processor to store remote Bloom-filters associated with respective peer-to-peer data connections, the Bloom-filters indicating data accessible via the respective peer-to-peer data connections;

means comprising a processor to form a query for locating one or more data objects of the network peers;

means comprising a processor to, for a given node of the plurality of nodes, evaluate other nodes of the plurality of nodes that connected to the given node based on the Bloom-filters and the incentive-based criteria to select one or more of the other nodes to propagate the search expression; and

means comprising a processor to send the query to a subset of the peer-to-peer data connections as a function of the query and the Bloom filters associated with the respective peer-to-peer data connections.

## **EVIDENCE APPENDIX**

None.

## **RELATED PROCEEDINGS APPENDIX**

None.